DOCUMENT RESUME

ED 172 768 IR 007 389

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TITLE Developing Effective TV Systems.
PUB DATE Mar 79
NOTE 10p.; Paper presented at the Learning Resources Association meeting (Charlotte, North Carolina, March 27, 1979)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Educational Facilities; *Educational Television; *Equipment Evaluation; *Facility Case Studies; Facility Guidelines; *Facility Planning; Higher Education; Video Equipment

ABSTRACT

This case study of the planning and organization of an on-campus educational television system, designed as both an instructional and a service oriented resource, includes descriptions of the goals of the system, the equipment purchased, and problems encountered. It was found that a versatile and relatively sophisticated system could be constructed with donated and used commercial equipment. Staff, space, and upkeep considerations are also covered. (JVP)

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DEVELOPING EFFECTIVE TV SYSTEMS

by

Ron P. Rankins

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

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DEVELOPING EFFECTIVE TV SYSTEMS

I joined the University staff in 1974 to organize a television production facility capable of producing instructional materials, on video tape, for the academic and other areas of our University community.

Organizationally, I report to the Director of Audiovisual Services which is a part of the Learning Resources Organization at A.S.U.

An effective TV system is one that supplies high quality television services to its customers. At our Instructional Television Center, we provide three basic types of services.

(1) Direct support to academic programs by maintaining and scheduling television studios and equipment for use as laboratories by broadcasting, educational media and other students.

This constitutes the most important services area for us and consumes most of our manpower resources.

Each semester, (Fall, Spring, Summer), we provide laboratory support for an average of three full class sections on a daily basis.

(2) Production of instructional materials is the next priority of our television center. We design, script, shoot, edit and distribute instructional programs on color, U-Matic videocassettes. Although I'm the only full-time staff person employed in television operations, with student help, we have produced programs in Mathematics, Computer Science, English Literature, Physics, Business, Tennis, History, Religion, Surgical Technique, Foreign Languages, Home Economics, News and Public Relations, Employee Orientation and other areas in the past five years. Today, students are using locally produced instructional programs in video carrels across our campus. We find video production and utilization cost effective. That is the key to its acceptance on our campus.

(3) Our third priority involves technical assistance and advice to our faculty and Administrative staff. We help design and install equipment and secure programming for television or related systems across the A.S.U. campus. Examples include: Cable Television, Distributions Systems in buildings for departments, playback systems for departmental use and assistance in locating or producing videotaped programs.

These three broad categories of services are more than enough to keep a full-time staff member and four part-time workers busy. We are not meeting all the demands on our campus. Individual departments and organizations have the option of purchasing or operating small amounts of television equipment. We try to provide the services that require sophisticated editing and mixing facilities. As we do a better job and reach more customers, we find these small "closet" video operations are becoming less attractive due to expense to departmental budgets for repair and maintenance of departmentally owned equipment.

Our present television facilities are located in the new Communication Arts building. We operate two studios and control rooms with monochrome and color recording and editing equipment. Learning Resources and the Department of Communication Arts are partners in our television center, the Academic Department supplies space in the building, and some departmental equipment. Learning Resources supplies staff, technical and production know-how, and electronic equipment.

The present facilities and organizational structure evolved as a result of technical, financial and administrative factors over the past five years. It is reasonable to expect any service organization, especially any that requires as much equipment, space and personnel support as television, to change and be modified as it grows. In tracing the growth of our television operations, I hope to help you avoid the pitfalls and capitalize on the successes of our organizational and technical synthesis.

In early 1974, we surveyed our faculty, department by department and developed a report outlining the production and service needs voiced by individual departments.

We began to contact commercial television stations around the region in an effort to acquire used or discarded TV equipment for installation at A.S.U. We were very fortunate to receive substancial donations of equipment from WBTV that year.

That summer I visited several public television production facilities around the country. I found facilities ranging in cost and sophistication from five million dollars to one 400 dollar camera and a used VTR. Each facility has grown to meet the requirements of its operating institution. The information both technical and organizational learned from this trip became the basis for a report on television in higher education and proved invaluable in the development of our TV facilities at Appalachian.

As you plan television facilities, I can think of no better starting point than visiting as many production facilities and asking as many questions as possible. Take notes, take pictures, gather technical data, get to know the practioner in your region.

After this fact finding mission was completed, we had solid information on our own campus needs and how other institutions were meeting these types of demands. We developed our first proposal for a television production service.

Beginning in late 1974, we began a construction and installation project that would end with the operation of a small, one studio, black and white facility operated jointly by AV Services and the Department of Speech and Broadcasting.

This studio facility was used to instruct students in broadcasting and Educational Media. We operated and maintained it while producing color and monochrome video tapes for approximately two years.

Beginning in early 1977, we began to plan and install dual color studios in the Communication Arts building then being constructed. We were able to install much of the previously donated and stored boradcast quality TV equipment in this faciltiy. At the end of calendar 1977, the old and new TV equipment was installed and we began operations, Spring Semester, 1978.

From our start in 1974, we had moved from one small converted classroom to two instructional color studios with broadcast quality electronics and color video tape capability. Unfortunately staffing has progressed more slowly. Other than myself, our total staff today is four part-time employees, two undergraduate student workers, one graduate assistant and one part-time electronics technician.

These part-time positions came slowly, but enable us to keep the facility operating and do limited television production.

I have reason to be optimistic. This summer we will add our first full-time staff person, an electronics technician who will make possible the shifting of some of our student workers to program production jobs.

As I mentioned earlier, our operations are conducted cooperatively with an academic department. The resources on our campus would not allow two separate television studio facilities, one for production and one for instruction. We have combined both objectives in one facility. This has presented a great organizational and administrative challenge. Careful scheduling, clear rules on use and operations and good communications between studio staff and instructors keep this cooperative effort working. As in most cooperative ventures, there are pitfalls.

Smooth operations require a clear reporting chain for the facilities manager, operating rules that are enforceable, technical support of the equipment and budgetary control for the operations manager.

As the only full-time employee attached to television operations, I have full responsibility for technical details of design and installation.

Many of the design considerations were predicated on the amount and type of equipment already owned by the University and the type and amount of equipment donated to us by various commercial television stations.

We limped along with marginal technical facilities in 1974-1976 until we could install the professional equipment donated during those years in our present facility.

We have tried to spend our very limited new equipment money in the areas of new technology such as low cost color cameras, medium cost, high capability color U-Matic videotape editors and small low cost but essential test and distribution equipment, (ie) SYNC generators, distribution amplifiers (etc.)

The combination of broadcast quality terminal equipment (video switchers and effect systems, audio mixers, lights, film chains etc.) with new simple "educational" color cameras and VTR's offers a very versital mix of production capability.

Because of the very competitive nature of commercial broadcasting in the U.S., most stations are depreciating and changing their technical equipment every 8 to 12 years. They seek equipment with more capabilities, more visual or audio effects, higher reliability. The gear they remove is often designed to operate economically for 15 to 25 years.

Our used equipment shopping list included video switchers and special effects systems, audio mixers, lights, lighting equipment, film projectors film chains, racks and any equipment that can be salvaged for parts.

We have found that discreet transitor equipment can be maintained for long periods if care is taken in the storage, movement and installation

of the equipment.

I should caution you about installing donated tube type equipment; some specialized broadcast equipment contains tubes that are increasingly hard to find. Tube equipment tends to be less stable, requiring more alignment attention and can create heat problems when mixed with other equipment.

Look for transistorized electronics on plug in modules. If you are lucky you might find spare, interchangeable modules and you may discover, as we have, that you can mix modules donated by different organizations to yield a very reliable system of maintenance.

Actively seek the equipment you need, use the equipment and let your benefactor know it is in use. We find station engineers and managers are very impressed when they see their old switcher in new condition producing clear video images five years after they discard it. Whenever we host personnel from commercial stations who see their old gear in action, we usually hear from them about some obsolete or unused hardware they would like hauled away. We oblige them; the same week if possible! Identify needed equipment, seek it out, follow through with refurbishment and installation, let your development and fiscal staff on campus know what you are doing. We have built our operation on donated equipment. You may be able to get your programs off the ground the same way.

The instructional needs of your campus and the type of video production you plan will define the type and amount of equipment you need.

The most common mix of capabilities include at least one studio with a lighting grid, sound isolation, adequate cooling and control and recording electronics that will permit simultaneous shooting, switching and mixing of two or more cameras plus optional sources such as a film pick-up, character generator or chroma-key. Additionally, this facility needs two color recorders capable of synchronous video editing and at least one field camera and recorder to shoot location footage. This basic package makes possible multi-camera studio production, field shooting and editing plus duplication of video tape. We have found the 3/4 color video cassette an economic format for our tape operations. The amount of production and the number of laboratory studio exercises required by your academic departments will determine the number of studios, editing stations and portable field recording units you will need. Let's examine design requirements for a one studio operation.

After determining production and academic demand, proposed staffing levels and possible sources of donated equipment, you must have adequate space to install and operate a television system.

Most important, you should be on a ground floor with direct access to a large loading dock area that will provide direct access to a central storage space. Raised "computer" type flooring in all areas except studio and storage will provide an effective means of inter-cabling the facility. You should consult with architects or engineers about sound isolation, cooling, power, distribution for equipment and lights, central compressed air for pneumatic tools and storage shelves and work surfaces. Office space, sheltered packing for video vans or other mobile equipment and make-up

or dressing areas are extra requirements that will vary. Specify all the space you need before construction begins.

As you define your mission and space requirements you begin to determine the type and number of cameras, VTR's and supporting equipment required.

Begin the electronic planning by evolving a functional block diagram of all video and audio sources, routing interconnection and recording.

For video you should detail the master SYNC system, pulse distribution and timing. All video sources should be outline and distribution amplifiers, cable runs, switching and recording diagrammed, path delay in system routing should be calculated.

Audio sources, distribution amplifiers, patching, processing and mixing should be diagrammed.

Finally all waveform and picture monitoring equipment and measurement systems should be diagrammed and all diagrams cross-checked for accuracy.

From these functional drawings, you can determine the type and amount of new equipment to purchase, the type of equipment to be sought from broadcasters, what existing equipment can be intergrated into the system and what equipment might be built locally.

Detailed specifications are bid for new equipment, donated equipment is rehabilitated, the construction is completed and the installation can begin.

Functional diagrams and detailed schematics developed in the design stage will allow the preparation of an installation schedule. Schedule mechanical placement of racks and consoles first, then progress with wiring harness, terminal equipment installation, pulse system installation, waveform and measurement equipment, the cameras, monitors, audio, VTR's, control equipment, lights, intercom work toward smaller sub-systems. Establish a completion date for each phase, and be sure to include extra time for trouble-shooting donated equipment or modifying it to fit educational grade cameras or VTR's. Your administrators should know where you stand, and if you are on schedule.

As the installation is completed and the facility placed in operation, be assured that whole sub-systems will have to be re-designed, ideas changed, drawings up-dated and plenty of spares prepared to make quick repair-response possible. You will be so relieved that all your "junk equipment" works these small chores will be a pleasure.

A functional facility cannot be designed without a trained technical person or staff to take responsibility and follow through. The facility cannot exist without regular technical maintenance. Our studios would be completely useless in one week without regular electronic maintenance.

The first step in developing effective and economical TV systems is to hire a competant technical person with a track record, provide him student help and let him start detailed technical planning.

Once the ship is launched, continue technical support and make plans to replace equipment as it wears out.

The effectiveness of a television production system is often measured by the amount of instructional materials produced and the quality of these materials.

At Appalachian, we began production of instructional materials before studio construction began. Our first production was a series of six, twenty minute videocassettes on how to play tennis. The series was prepared for the Health, Physical Education and Recreation Department and is still in use today.

We met with the faculty members who wanted to produce the series, found financial support from our administration, paid salaries for the faculty members to develop the preliminary outline and scripts, hired a director/ writer to re-write the scripts and direct the shooting. We secured a tennis court and other on location areas for the production, found performers, players and the instructor and began to shoot.

This first television production was shot on 16mm color sound film. The University owned an old but well maintained 16mm film camera which we pressed into service. This original footage was transferred to two-inch video tape, edited to a two inch master and duplicated to video cassette. We were very lucky to have had the use of an educational studio at East Tennessee State University at no cost for the dubbing and editing of the first 4 tapes. During this project we purchased a portable U-Matic Recorder, portable color camera and two color videocassette editing VTR's.

The last two scripts in the six tape series were shot directly onto 3/4" tape, edited onto a 3/4" master at A.S.U. and dubbed to a cassette release copy. The quality of the last two tapes was at least as good as those tapes shot with expensive 16mm film, edited on $100,000 two inch machines and dubbed to cassette.

Because we used both film and video techniques on this project, we were able to develop a cost comparison between the two methods. Neglecting cost of equipment, we found, for this project, film production cost nearly 5 dollars per minute while all video production cost less than 50 cents per program minute.

Locally produced video tape is one of the most economical, practical ways to produce and distribute instructional materials.

We receive production requests directly from faculty members and through our on campus instructional development group. We charge only for materials used on a project plus any transportation or lodging costs. Salaries for performers or faculty must be supplied by the agency requesting production.

Our efforts begin with pre-production meetings weeks or months in advance of the project deadline. The script is outlined, production deadlines are established, budget for materials, travel and performers is acquired and after scripts are complete, the shooting begins.

Most productions are shot single camera video onto 3/4" videocassette film style, a scene at a time. Working with professors, administrators an students, we shoot 5 to 10 takes for every scene. Here the re-usability of video-tape saves a great deal of money.

After each scene of the script is shot,notes made and the script marked, the tedious business of post production can begin. We make titles, special effects and other complex visual and audio segments in our studio facilities. These segments can be edited into footage shot on location to give a very polished edited master tape.

The Sony VO-2850 videocassette editor has made low cost video production possible. These machines are the workhorse of many studios. We use them to edit location footage into a finished product. They also make studio shooting easier. A segment may be inserted in a tape or audio and video overdubbed to achieve a complex sequence.

This technique of shooting video film style is very economical and I believe it will be adopted by education, industry and broadcasting to a greater degree than today. For a basic facility one portable recorder and camera, two VTR's for editing and some MIC and Light gear will put you in business.

Many formats and technical problems surround this new production technology but the 3/4" videocassette format is now a proven system. Because we do not require the technical standards required of broadcasters we can use this moderate price technology to great advantage.

If care is exercised in keeping the number of generations to a minimum, the release copy can yield a high quality video image. The original footage I mentioned earlier can be erased and re-used. Often for simple productions, the only costs are a few dollars for graphics or titles and the cost of several 30 or 60 minute videocassettes. This makes video inexpensive enough to use regularly in the classroom.

Great video tape is worthless without playback equipment located in or near the classroom or learning laboratory areas. Well maintained tape players and color monitors need to be available for general check-out and installed in learning lab carrels. A large screen color video projector should be available in at least one campus location to serve groups up to 200.

Some productions can only be created in a controlled studio environment, some can only be shot on location. Most require both location shooting an studio sequences. Both options are necessary for comprehensive television production.

Our studios also serve for still and motion picture shooting, audio recording and performance rehearsal areas.

Technique and facilities are important but adequate production crew is essential. In the studio, you need trained camera crew, audio and tape operators, technical directors and performers. In the field you need someone to help carry the endless cables, lights, cameras, and extension cords that are the trademark of "portable" television, help with audio, camera and lighting in the field will allow the director to direct instead of operating the camera & VTR.

Students, the best source of crew in the studio and on location, can profit immensely from these team efforts. They will make production on a miniscale budget possible. Establish internships, independent study opportunities and work-study jobs that will incorporate the student into your production plans.

No part of television technology or technique is standing still. Every part of this field is evolving at an accellerating rate.

One inch video tape recorders promise to bring broadcast quality production capability to the educational and industrial producer. These top performing "C" format moderate cost devices are already finding wide acceptance in the broadcast industry.

Digital processing, switching, effects and enhancement will bring more sophisticated, more reliable, more portable terminal equipment into the educational studio.

New medium priced color cameras will make multi-camera color operation a reality for more schools. The prospect of solid state pick-up devices could result in color cameras that cost no more than current portable black and white cameras.

The crest of the wave in new video recording and playback is already here. The 2 and 4 hour good quality VHS and BETA tape systems are an attractive distribution medium for schools and industry.

Video discs will soon be a commercial reality that I believe will rival tape, film and other traditional media.

But the brightest technological star is the marriage of geostationary communications satellites and cable television systems. The ability to

receive wide band video on a remote and relatively inexpensive earth terminal and transmit that program with other signals directly to homes, offices or classrooms opens tremendous possibilities.

At Appalachian we have designed and are working toward the installation of a campus wide broad-board cable system. A milti-use RF distribution system installed underground in existing utility conduit that could carry two-way video, voice, data and other services to all campus buildings and facilities. We hope to have this system in operation by the early 80's and estimate it to have a useful life of 15 to 20 years. It will revolutionize the way we deliver tape and film programs and may have a profound impact on computer services, campus radio broadcasting, environmental control systems and security services. We believe it to be the next big step into our future.

I'm excited about television services. I know they can be effective, economical and accountable. Technological and production innovations are making instructional television accessable to every segment of the educational community.